Geometrical Optics based path loss model for furnished indoor environment

ABSTRACT

This paper describes the Geometrical Optics (GO) based path loss model for indoor environment path loss prediction. Both Geometrical Optics based total rays model and direct ray path loss model were developed. Optimization was then conducted to improve both models in path loss prediction for case of Line-Of- Sight (LOS) indoor environment. Both Geometrical Optics based total rays model and direct ray model were optimized with log-distance-dependent expression using least-square approach. This log-distance-dependent expression includes all effects due to multiple reflection and all uncertainties which is distance-dependent. The path loss measurement was conducted in Division of Information Technology (DITSC), Universiti Putra Malaysia. Both models were optimized with measured path loss which was collected from DITSC. The value of correction factor and coefficient in additional expression for optimized GO were developed and presented in this paper. The optimized GO based modes ware validated at five buildings in Universiti Putra Malaysia by referring to the absolute mean error for its accuracy and effectiveness in path loss prediction. The optimized direct ray model shows the best accuracy compared with optimized total rays model, direct ray model and total rays model.

Keyword: Geometrical optics; Indoor propagation; Optimization; Path loss